UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,283	12/15/2003	Francois-Xavier Musalem	1488/12/2	4294

25297 7590 07/13/2005

JENKINS, WILSON & TAYLOR, P. A.
3100 TOWER BLVD
SUITE 1400
DURHAM, NC 27707

EXAMINER	
DICKEY, THOMAS L	
ART UNIT	**PAPER NUMBER**
2826	

DATE MAILED: 07/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

Office Action Summary	Application No.	Applicant(s)	
	10/736,283	MUSALEM ET AL.	
	Examiner	Art Unit	
	Thomas L. Dickey	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7-140* is/are pending in the application.

4a) Of the above claim(s) *19,25-45,56,63-79 and 91-140* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7-18,20-24,46-55,57-61 and 80-90* is/are rejected.

7)☒ Claim(s) *62* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 May 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed on 12/03/04 has been entered.

Election/Restriction

2. Applicant's election without traverse of Group II, claims 7-26, 46-63, 80-93, 108-120, and 133-136, and the embodiment of figures 1-3 in the Paper filed 04/21/05 is acknowledged.

Drawings

3. The formal drawings filed on 14 May 2004 are acceptable.

Claim Objections

4. Claims 54,57, and 88-90 are objected to because of the following informalities:

In claim 54 Applicant uses the language "...comprising a movable component attached to..." Applicant already introduced "a movable component" in claim 46, from which claim 54 depends. For examination purposes it will be assumed that in claim 54, applicant intended to write, "...wherein the movable component is attached to..." instead of "...comprising a movable component attached to..."

In claim 57 Applicant uses the language "...comprising a substrate attached to..." Applicant already introduced "a substrate" in claim 46, from which claim 57 depends.

For examination purposes it will be assumed that in claim 57, applicant intended to write, "...wherein the substrate is attached to..." instead of "...comprising a substrate attached to..."

In claims 88-90 Applicant repeatedly uses the terms "the at least one movable actuation electrode," and "the movable at least one capacitive electrode," for neither of which any antecedent basis is apparent in claims 88-90 or their base claims. It will be assumed Applicant intended to use the terms "the first actuation electrode," and "the first capacitive electrode."

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 7-17,20,21,46-55,57,58 and 80-90 are rejected under 35 U.S.C. 102(e) as being anticipated by DE LOS SANTOS (2004/0036132).

With regard to to claims 7-14,20, and 21, de los Santos discloses a MEMS variable capacitor, comprising (a) first 116 and second 112 actuation electrodes being spaced apart, and at least one 116 of the actuation electrodes being movable with respect to the other 112 actuation electrode when a voltage is applied across the first 116 and second 112 actuation electrodes; (b) a first capacitive electrode 118 attached to and electrically isolated from the first actuation electrode 116; (c) a second capacitive electrode 114 attached to and electrically isolated from the second actuation electrode 112 and spaced from the first capacitive electrode 118 for movement of at least one 118 of the capacitive electrodes in a substantially straight direction with respect to the other 114 capacitive electrode upon application of voltage across the first 116 and second 112 actuation electrodes to change the capacitance between the first 118 and second 114 capacitive electrodes; (d) a substrate 102 attached to the second actuation electrode 112 and the second capacitive electrode 114; and (e) a plurality of tethers 110 (note particularly the top view of figure 4) attaching the first 118 and second 114 capacitive electrodes to the first 116 and second 112 actuation electrodes, respectively, wherein the tethers 110 are flexible for allowing movement of the capacitive electrodes with respect to one another, the first 116 and second 112 actuation electrodes are composed of a material selected from the group consisting of metal, semi-metal, doped

semiconductor, and combinations thereof, wherein the substrate 102 electrically isolates the second actuation electrode 112 and the second capacitive electrode 114, the first 118 and second 114 capacitive electrodes are composed of a material selected from the group consisting of metal, semi-metal, doped semiconductor, and combinations thereof, the tethers 110 are operable to produce a biasing force to oppose movement of capacitive electrodes with respect to one another and are composed of material selected from the group consisting of silicon, alumina, silica, polymers, and combinations thereof, wherein at least one of the tethers 110 extends substantially perpendicular to a radial direction from about the center of at least one 118 of the capacitive electrodes and at least one of the tethers 110 extends substantially perpendicular to a radial direction from about the center of at least one 116 of the actuation electrodes. Note figures 1-4 and paragraphs 0036-0043 of de los Santos.

With regard to to claims 15-17, de los Santos discloses a MEMS variable capacitor, comprising (a) first 116 and second 112 actuation electrodes being spaced apart, and at least one 116 of the actuation electrodes being movable with respect to the other 112 actuation electrode when a voltage is applied across the first 116 and second 112 actuation electrodes; (b) a first capacitive electrode 118 attached to and electrically isolated from the first actuation electrode 116; and (c) a second capacitive electrode 114 attached to and electrically isolated from the second actuation electrode 112 and spaced from the first capacitive electrode 118 for movement of at least one 118 of the capacitive electrodes in a substantially straight direction with respect to the other 114

capacitive electrode upon application of voltage across the first 116 and second 112 actuation electrodes to change the capacitance between the first 118 and second 114 capacitive electrodes; (d) a movable component 104-106 attached to the at least one 116 movable actuation electrode and the movable at least one 118 movable capacitive electrode. Note figures 1-4 and paragraphs 0036-0043 of de los Santos.

With regard to to claims 46-58, de los Santos discloses a MEMS variable capacitor, comprising (a) a movable component 104-106 being movable with respect to a substrate 102 and comprising a first 106 and second 104 portion, wherein the first portion 106 is positioned further from the substrate 102 than the second portion 104; (b) first 116 and second 112 actuation electrodes being spaced apart, wherein the first actuation electrode 116 is attached to the first portion 106 of the movable component 104-106, wherein the second actuation electrode 112 is attached to the substrate 102, and wherein the first actuation electrode 116 is movable with respect to the second actuation electrode 112 when a voltage is applied across the first 116 and second 112 actuation electrodes; (c) a first capacitive electrode 118 attached to the second actuation electrode 112; (d) a second capacitive electrode 114 attached to the second portion 104 of the . movable component 104-106 and spaced from the first capacitive electrode 118 for movement of the first capacitive electrode 118 with respect to the second capacitive electrode 114 upon application of voltage across the first 116 and second 112 actuation electrodes to change the capacitance between the first 118 and second 114 capacitive electrodes; and (e) a plurality of tethers 110 (note particularly the

top view of figure 4) attaching the first 118 and second 114 capacitive electrodes, wherein the tethers 110 are flexible for allowing movement of the capacitive electrodes with respect to one another, the first 116 and second 112 actuation electrodes are composed of a material selected from the group consisting of metal, semi-metal, doped semiconductor, and combinations thereof, the first 118 and second 114 capacitive electrodes are composed of a material selected from the group consisting of metal, semi-metal, doped semiconductor, and combinations thereof, the tethers 110 are operable to produce a biasing force to oppose movement of capacitive electrodes with respect to one another, the tethers 110 are composed of material selected from the group consisting of silicon, alumina, silica, polymers, and combinations thereof, at least one of the tethers 110 extends substantially perpendicular to a radial direction from about the center of at least one 118 of the capacitive electrodes, at least one of the tethers 110 extends substantially perpendicular to a radial direction from about the center of at least one 116 of the actuation electrodes,, wherein the movable component 104-106 is attached to the at least one 116 movable actuation electrode and the movable at least one 118 capacitive electrode and the movable component 104-106 electrically isolates the at least one 116 movable actuation electrode and the at least one 118 movable capacitive electrode, and wherein the substrate 102 attached to the second actuation electrode 112 and the second capacitive electrode 114 and the substrate 102 electrically isolates the second actuation electrode 112 and the second capacitive electrode 114. Note figures 1-4 and paragraphs 0036-0043 of de los Santos.

With regard to to claims 80-90, de los Santos discloses a MEMS variable capacitor, comprising (a) first 116 and second 112 actuation electrodes being spaced apart, wherein the first actuation electrode 116 is movable with respect to the second actuation electrode 112 when a voltage is applied across the first 116 and second 112 actuation electrodes; (b) a first capacitive electrode 118 attached to the first actuation electrode 116; and (c) a second capacitive electrode 114 attached to the second actuation electrode 112 and spaced from the first capacitive electrode 118 for movement of the first capacitive electrode 118 with respect to the second capacitive electrode 114 upon application of voltage across the first 116 and second 112 actuation electrodes to change the capacitance between the first 118 and second 114 capacitive electrodes, wherein the capacitive electrodes are spaced closer to one another than the actuation electrodes; (d) a movable component 104-106 attached to the at least one 116 movable actuation electrode and the movable at least one 118 capacitive electrode; and (e) a plurality of tethers 110 (note particularly the top view of figure 4) attaching the first 118 and second 114 capacitive electrodes, wherein the tethers 110 are flexible for allowing movement of the capacitive electrodes with respect to one another, the first 116 and second 112 actuation electrodes are composed of a material selected from the group consisting of metal, semi-metal, doped semiconductor, and combinations thereof,the first 118 and second 114 capacitive electrodes are composed of a material selected from the group consisting of metal, semi-metal, doped semiconductor, and combinations thereof and the tethers 110 are operable to produce a

biasing force to oppose movement of capacitive electrodes with respect to one another, wherein the tethers 110 are composed of material selected from the group consisting of silicon, alumina, silica, polymers, and combinations thereof, at least one of the tethers 110 extends substantially perpendicular to a radial direction from about the center of at least one 118 of the capacitive electrodes, at least one of the tethers 110 extends substantially perpendicular to a radial direction from about the center of at least one 116 of the actuation electrodes, and the movable component 104-106 electrically isolates the at least one 116 movable actuation electrode and the at least one 118 movable capacitive electrode, and wherein the movable component 104-106 comprises a first 106 and second 104 portion, wherein the first portion 106 is positioned further from the first actuation electrode 116 than the second portion 104, wherein the first actuation electrode 116 is attached to the first portion 106 of the movable component 104-106, and wherein the first capacitive electrode 118 is attached (by way of the first portion 106) to the second portion 104 of the movable component 104-106. Note figures 1-4 and paragraphs 0036-0043 of de los Santos.

Claims 7,8,15,18,20,22-24,46,57, and 59-61 are rejected under 35 U.S.C. 102(b) as being anticipated by DEANE ET AL. (6,377,438).

With regard to claims 7,8,20, and 22-24 Deane et al. discloses a MEMS variable capacitor, comprising (a) first 114 and second 104 actuation electrodes composed of a material selected from the group consisting of metal, semi-metal, doped semiconductor, and combinations thereof, and spaced apart, and at least one 114 of the actuation

electrodes being movable with respect to the other 104 actuation electrode when a voltage is applied across the first 114 and second 104 actuation electrodes; (b) a first capacitive electrode 16 attached to and electrically isolated from the first actuation electrode 114; (c) a second capacitive electrode 12 attached to and electrically isolated from the second actuation electrode 104 and spaced from the first capacitive electrode 16 for movement of at least one 16 of the capacitive electrodes in a substantially straight direction with respect to the other 12 capacitive electrode upon application of voltage across the first 114 and second 104 actuation electrodes to change the capacitance between the first 16 and second 12 capacitive electrodes; and (d) a substrate 14-28 attached to the second actuation electrode 104 and the second capacitive electrode 12; wherein the substrate 14-28 comprises a first 14 and second 28 portion, wherein the first portion 14 is positioned further from the first actuation electrode 114 than the second portion 28, wherein the second actuation eiectrode is attached to the first portion 14 of the substrate 14-28, and wherein the second capacitive electrode 12 is attached to the second portion 28 of the substrate 14-28 and the second actuation electrode 104 is buried in the substrate 14-28 and the substrate 14-28 comprises one or more layers. Note figures 1-3, column 5 lines 30-67, and column 6 lines 50-55 of Deane et al.

With regard to claims 7,15, and 18 Deane et al. discloses a MEMS variable capacitor, comprising (a) first 114 and second 104 actuation electrodes being spaced apart, and at least one 114 of the actuation electrodes being movable with respect to

the other 104 actuation electrode when a voltage is applied across the first 114 and second 104 actuation electrodes; (b) a first capacitive electrode 16 attached to and electrically isolated from the first actuation electrode 114; and (c) a second capacitive electrode 12 attached to and electrically isolated from the second actuation electrode 104 and spaced from the first capacitive electrode 16 for movement of at least one 16 of the capacitive electrodes in a substantially straight direction with respect to the other 12 capacitive electrode upon application of voltage across the first 114 and second 104 actuation electrodes to change the capacitance between the first 16 and second 12 capacitive electrodes; (d) a movable component 20-26 attached to the at least one movable actuation electrode 114 and the movable at least one movable capacitive electrode 16, wherein the movable component 20-26 comprises a first 20 and second 26 portion, wherein the first portion 20 is positioned further from the first actuation electrode 114 than the second portion 26, wherein the first actuation electrode 114 is attached (by way of the second portion 26) to the first portion 20 of the movable component 20-26, and wherein the first capacitive electrode 16 is attached (by way of the first portion 20) to the second portion 26 of the movable component 20-26, and wherein the distance between the actuation electrodes 114-104 is larger by a factor of three or more than the distance between the capacitive electrodes. Note figures 1-3, column 5 lines 30-67, and column 6 lines 50-55 of Deane et al.

With regard to claims 46,57, and 59-61 Deane et al. discloses a MEMS variable capacitor, comprising (a) a movable component 20-26 being movable with respect to a

substrate 14-28 and comprising a first 20 and second 26 portion, wherein the first portion 20 is positioned further from the substrate 14-28 than the second portion 26; (b) first 114 and second 104 actuation electrodes being spaced apart, wherein the first actuation electrode 114 is attached (by way of the second portion 26) to the first portion 20 of the movable component 20-26, wherein the second actuation electrode 104 is attached to the substrate 14-28, and wherein the first actuation electrode 114 is movable with respect to the second actuation electrode 104 when a voltage is applied across the first 114 and second 104 actuation electrodes; (c) a first capacitive electrode 16 attached to the second actuation electrode 104; (d) a second capacitive electrode 12 attached to the second portion 26 of the movable component 20-26 and spaced from the first capacitive electrode 16 for movement of the first capacitive electrode 16 with respect to the second capacitive electrode 12 upon application of voltage across the first 114 and second 104 actuation electrodes to change the capacitance between the first 16 and second 12 capacitive electrodes; and (e) a substrate 14-28 attached to the second actuation electrode 104 and the second capacitive electrode 12, wherein the substrate 14-28 comprises a first 14 and second 28 portion, wherein the first portion 14 is positioned further from the first actuation electrode 114 than the second portion 28, wherein the second actuation electrode 104 is attached (via second portion 28) to the first portion 14 of the substrate 14-28, and wherein the second capacitive electrode 12 is attached (via first portion 14) to the second portion 28 of the substrate 14-28, and wherein the second actuation electrode 104 is buried (by virtue of being enclosed in

multiple layers 103 and 106) in the substrate 14-28 and the substrate 14-28 comprises one or more layers (multiple layers 103 and 106). Note figures 1-3, column 5 lines 30-67, and column 6 lines 50-55 of Deane et al.

Allowable Subject Matter

6. Claim 62 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

7. Applicant's arguments with respect to claims 7-18,20-24,46-55,57-61 and 80-90 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas L Dickey whose telephone number is 571-272-1913. The examiner can normally be reached on Monday-Thursday 8-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TLD
07/05

NATHAN J. FLYNN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800